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PROCESS PERFORMANCE ANALYSIS TO MINIMIZE PRODUCTION COST OF STARTUP CULINARY BUSINESS

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Abstract. DeliBowl is a company engaged in the culinary field that offers a variety of rice bowl, which have been operated for a year. From the problems stated, the most significant issue is the inefficient of the production processes and the cost which causes the low of the profit margin. This problem negatively affect the performance of the company, mainly to get the high performance of the business. Therefore, the researcher conduct the research to develop the solution to the operational problems faced by DeliBowl. This research requires a benchmark to a culinary business named Yagami Ramen House which may have better operation management to be the milestone of the better recommendation which will be the result of this study. The objective of this research is to implement the proper operational strategy to push down the costs and get the high performance in order to solve their operational problems. The recommendation which is expected is after applying the strategies which will be discussed, DeliBowl process will be more efficient, low cost, and get the high performance. To do this research, the researcher collect primary data by observing the production at DeliBowl and interviewing Yagami Ramen House management. From those data, the researcher will analyze operational process, process performance and the production cost. The result of this research is the recommendation of operation management strategy which will be more efficient, low cost, and high performance.

Keywords—Operational Process, Process Performance, Production Cost.

Introduction

Food Industry is a typical supply chain system. Its performance is heavily based upon the interactive activities between entities and nodes. In early 2016, DeliBowl started pre-order system, where buyers place an order before the food is processed. At that time, DeliBowl has outsourced cooker, where cooking services charged Rp 3,000.00 per portion. DeliBowl targeting students as its target market, therefore, DeliBowl set low prices in order to be accepted by the market. DeliBowl sales at the beginning of 2016 reached around Rp 4,000,000.00 in the second month. During the course of such that system, DeliBowl get a small profit margin because operational costs are quite high, such as foodstuffs, packaging, as well as the cost of rent. DeliBowl is a company engaged in the culinary field that offers a variety of rice bowls. DeliBowl established in May 2015 and provides great food, serves many different variety of Indonesian cuisines, Asian cuisines, and other nation cuisines. DeliBowl provide main courses which contain rice, topping such as chicken, fish, egg, vegetables, and many more. They always innovate our menu because the owner stated that customer is number one. DeliBowl differentiation between other rice bowl brands is the additional sauce itself, which has the characteristic in the flavor. We open at Jalan Ir. H. Juanda 109, Bandung from 15.00 until 22.00. They do have brand as our intellectual resource, is taken from word “Delicious” and “Bowl”, which has meaning that every bowl they offer, contains delicious food. They not only operate in the place, but also they do the pre-order system. They also run our business such as catering

order, so that when an institution make an order minimum 20 portions, they could proceed it. DeliBowl has two distribution channels such as selling in the place (direct-selling system) and pre-order system. For the pre-order system, DeliBowl often serve the orders in big quantities, minimum 20 portions per day. DeliBowl do the production by using equipment and a place for limited production. DeliBowl only has one stove, small size skillet, small size pot, and the space for the place which is not wide enough. For the pre-order system, DeliBowl uses outsourced cookers because they are able to process the orders in big quantities.

In DeliBowl financial data, they had the profit margin about 9% from pre-order system, and 14% from direct-selling system. Based on fishbone analysis, there are five classifications problem that are methods, materials, measurements, environment and manpower. The problem in the methods are; pre-order system causes high cost. Then, the problems that exist in material is; DeliBowl still do not have supplier in raw materials and packaging. The problem in the manpower are; DeliBowl have outsourced cooker to ease the preorder system, but it costs high. The existing power in measurements are; DeliBowl the key performance indicators result such as the flow time (21 minutes/unit), cycle time (41.85 minutes/unit), throughput rate (0.023 units/minute), efficiency (57%), productivity (2.51 units/hour), and utilization (40%) are still in bad condition. From the above problems, the most significant issues is the high production cost. And these problems adversely affect the performance of the company, mainly to meet demand for the product. This problem negatively affect the performance of the company, mainly to get the high profit of the business.

Literature Review

a) Business Process
process is something more ambiguous with different meanings, depending on the context in which it is used. For example, a biologist or medical doctor refers to breathing as a life-sustaining process. Manuel Laguna, in Business Process Modeling, Simulation, and Design, stated that in mathematics or engineering, the concept of random or deterministic processes describes event occurrences. “In politics, the importance of election processes is obvious, in education a key concept is the learning process, and so on.” Merriam Webster’s Dictionary, online 11th edition, defines process as (i) a natural phenomenon marked by gradual changes that lead to a particular result, (ii) a natural continuing activity or function, or (iii) a series of actions or operations conducing to an end (Laguna, 2005). To conclude, the definition of business process through this study is a process specifies the transformation of inputs to outputs

b) The Essence of Business Process Design
The principle of business process design can be described as how to do things in a good way. Good in this condition refers to process efficiency and process effectiveness. The last assertion is important; process design is about satisfying customer requirements in an efficient way. An efficient process that does not deliver customer value is useless. A well-designed process does the right things in the right way (Laguna, 2005).

c) Business Process Mapping and Design
number of tools help the researcher understand the complexities of process design and redesign. They are simply ways of making sense of what happens or must happen in a process.
   1) Flowchart
   Flowchart is the first tool which is schematic or drawing of the movement of material, product, or people (Heizer, 2011). The flowchart can be used to convey additional information, going beyond the sequence of activities and the logical steps in the process (Heizer, 2011). Tasks are shown as rectangles, flows as arrows, decision indicator as diamonds. Sometimes flows through a process can be diverted in multiple directions

depending on some condition. Separating a diagram into different horizontal or vertical bands sometimes is useful because it allows the separation of tasks that are part of the process (Jacobs, 2014).

2) Time-Function Mapping
This second tool is also flowchart, but with time added on the horizontal axis, which is schematic or drawing of the movement of material, product, or people. Such charts are sometimes called time-function mapping, or process mapping. With time-function mapping, nodes indicate the activities and the arrows indicate the flow direction, with time on the horizontal axis. This type of analysis allows users to identify and eliminate waste such as extra steps, duplication, and delay (Heizer, 2011).

Cost Elimination Through Process Improvement

Every business process has inputs, which are processed to deliver outputs (example):

- Inputs : Application forms, Quotes
- Process : Data input, completing forms
- Outputs : completed applications

The level of outputs are less than the input due to errors (re-work), poor quality and wastage. By doing business process improvement, quality and output is increased and costs are reduced (Misiewicz, 2010).

Process Performance

There is much variation in the way performance metrics are calculated in practice. This section defines metrics in a manner consistent with the most common use in practice. It is vital, to understand exactly how a metric coming from a particular company or industry is calculated prior to making any decisions. This would be easier if metrics were calculated more consistently, but this is just not the case (Jacobs, 2014).

Utilization is the ratio of the time that a resource is actually being used relative to the time that is available for use. Utilization is always measured in reference to some resource – for example, the utilization of direct labor or the utilization of a machine resource. The distinction between productivity and utilization is important. **Productivity** is the ratio of output to input (Jacobs, 2014). Productivity measurement can be quite direct, when productivity is measured by labor-hours per product in DeliBowl. Although labor-hours is a common measure of input, other measures such as capital (rupiahs invested), materials, or gas can be used. The use of just one resource input to measure productivity, is known as **single-factor productivity** (Heizer, 2011). However, a broader view of productivity is **multifactor productivity**, which includes all inputs (e.g., capital, labor, material, energy). **Efficiency** is a ratio of the actual output of a process relative to some standard (Jacobs, 2014). For example, consider a machine designed to package cereal at a rate of 30 boxes per minute. If during a shift the operators actually produce at a rate of 36 boxes per minute, then the efficiency of the machine is 120 percent (36/30). **Run time** is the time required to produce a batch of parts. This is calculated by multiplying the time required to produce each unit by the batch size. The **setup time** is the time required to prepare a machine to make a particular item. In this case, the setup time is occur when preparing the place until ready to open (direct selling). The **operation time** is the sum of the setup time and run time for a batch of parts that are run on a machine (Jacobs, 2014).

Flow time is the average time that it takes a unit to over through an entire process. Flow time includes the time that the unit spends actually being worked on together with the time spent waiting in a queue. As a simple example, consider a paced assembly line that has six stations and runs with a cycle time of 30 seconds. If the stations are located one right after another and every 30 seconds parts move from one station to the next, then the throughput time is three minutes

(30 seconds x 6 stations/60 seconds per minute). The **throughput rate** is the output rate that the process is expected to produce over a period of time. The throughput rate of the assembly line is 120 units per hour (60 minutes/hour x 60 seconds/minute / 30 seconds per unit). In this case, the throughput rate is the mathematical inverse of the cycle time. The **cycle time** is the average time between completions of successive units in a process (Jacobs, 2014).

Methodology

Collecting Data

This study collects primary data derived from direct observation to DeliBowl and conducted interview for the benchmark to Ramen House. Observation is a method of data collection is done by a systematic observation of the object under study, then do the recording of the things that are found throughout the process (Supardi, 2006). There are several forms of observation, including participant observation and nonparticipant observation. Participant observation is a form of observation by participating or taking part in activities conducted by the target (Supardi, 2006). In this study, the form of observations are made in the form of participant observation in DeliBowl, which will be directly involved in the activities at the company's operation. In addition, this study requires data from DeliBowl, such as sales data, operating process, and bill of materials.

Analyzing Data

This stage will present the results such as the current business process mapping of DeliBowl, the process performance, costs elimination through process improvement, and productivity improvement. This study further interpret the results by plotting the process inside the company, determine its costs, making process improvement and also productivity improvement.

1. Business Process Mapping and Design

This study use 2 simple ways of making sense of what happens or must happen in a process. The tools are as follow:

- **Flowchart**, the first tool which is schematic to the movement of material, product, or people in DeliBowl. The flowchart will be applied to pre-order system and direct-selling system inside DeliBowl Company and also Ramen House as a benchmark.
- This second tool is as same as flowchart with time added on the horizontal axis, which will be applied to pre-order system and direct-selling system inside DeliBowl Company and also Ramen House.
- **Process Performance**. This section defines the calculation of process performance inside DeliBowl Company and also Ramen House.
- **Cost Elimination through Process Improvement**. This section has a purpose to identify the inefficiencies, then remove the selected inefficiencies. It is expected to have increased quality and output, and costs are reduced by improving business process.

Data analysis

Determining costs

Pre-order system

Table 1 pre-order system cost mapping

Activity	Cost/Revenue
Order	Rp0
Check the availability of raw materials & packaging	Rp0
Give the money to the outsourced cooker for buying raw materials	Rp244,120
Go to Pasar Ciroyom	Rp0
Go to Jl. Cibadak (need money for fuel)	Rp10,000
Buy Raw Materials	Rp0
Buy Packaging (cost per packaging = Rp 1.200, times 20)	Rp28,000
Go to Jl. Dipatiukur (for parking fee)	Rp2,000
Print Sticker (A4 sticker)	Rp5,000
Go to Storage (parking fee)	Rp2,000
Keep the packaging and put the sticker	Rp0
Give the packaging to outsourced cooker	Rp0
Communicate the order with the outsourced cooker	Rp0
Process the order	Rp0
Take the products	Rp0
Deliver to resellers	Rp0
Pay the outsourced cooker	Rp60,000
Go Home	Rp0
Book Keeping	Rp0
TOTAL OPERATIONAL COST	Rp351,120
SALES	Rp300,000

SALES PRE-ORDER SYSTEM PER MONTH (25 days)	Rp7,500,000	COST PER MONTH (25 days)	MARGIN PER MONTH
IF RAW MATERIALS & PACKAGING ARE AVAILABLE (RM (+))	**Rp60,000**	**Rp1,500,000**	**Rp6,000,000**
IF RAW MATERIALS & PACKAGING ARE OUT OF STOCK, BUT STICKERS ARE AVAILABLE (RM (-), ST (+))	**Rp306,120**	**Rp7,653,000**	**- Rp7,593,000**
IF RAW MATERIALS & PACKAGING, AND STICKERS ARE OUT OF STOCK (RM (-), ST (-))	**Rp351,120**	**Rp8,778,000**	**- Rp8,471,880**

In Table 1, there are activities which need costs to be accomplished. We can see that the costs occurred is very high, especially in event 2 and event 3 of preorder system when materials and packaging are out of stock, but stickers are available (event 2); and when raw materials, packaging and stickers are out of stock (event 3). DeliBowl Company would have profit margin below 0 rupiah, or in other words, loss. If this continued, the company would go bankrupt sooner or later. Pre-order system may have less time needed than direct-selling system. But the term of efficiency has not been fully answered only by the analysis of the time-function mapping. After this, the researcher will tell about the breakdown of direct-selling costs.

a) Direct-Selling System

Direct-selling system have different cost structure. DeliBowl usually go to the market and Jl. Cibadak 2 times a week, or let we assume 8 times per month. So that the cost structure will be counted 8 times to get the result per month cost.

Table 2 Direct-Selling System Cost Mapping

Activity	Per one-time Re Stock (Halfweek)	Per Month (8 times re stock)
Go to DeliBowl	Rp0	Rp0
Check the availability of raw materials & packaging	Rp0	Rp0
List the raw materials needed	Rp0	Rp0
Go to Pasar Ciroyom (Parking Fee)	Rp2,000	Rp16,000
Buy Raw Materials for 3 day supply	Rp529,098	Rp4,232,784
Go to Jl. Cibadak (Fuel Cost)	Rp10,000	Rp80,000
Buy Packaging for 3 day supply	Rp84,000	Rp672,000
Go to Jl. Dipatiukur (parking fee)	Rp2,000	Rp16,000
Print Sticker for 3 day supply	Rp15,000	Rp120,000
Go back to DeliBowl	Rp0	Rp0
Sticker Assembling	Rp0	Rp0
Keep the raw materials and Packaging in the storage	Rp0	Rp0
TOTAL OPERATIONAL COST	**Rp642,098**	**Rp5,136,784**
TOTAL SALES	**Rp990,000**	**Rp7,920,000**
PROFIT MARGIN	**Rp347,902**	**Rp2,783,216**

Direct-selling system seems to have less cost than the pre-order system. All of the events occurred have profit margin far more than the pre-order system. Based on the data provided in *Table 2*, the term of efficiency still has not been fully answered only by the analysis of the cost mapping because the direct-selling system has more time needed than pre-order system to be done.

B. Process Performance

To understand exactly how the performance is calculated in practice, this section defines metrics in a manner consistent how far the performance of each system. The researcher will discuss the calculation of performance for the pre-order system and direct-selling system.

Table 3 Pre-Order System Process Performance Metrics

Pre-Order System					
No.	Metrics	Units	RM (+)	RM (-), ST (+)	RM (-), ST (-)
1	Setup Time	minutes	20	210	235
2	Run Time	minutes	176	176	176
3	Flow Time (Total Run Time/Actual Output)	minutes/unit	8.8	8.8	8.8
4	Cycle Time (Total Time Activated/Actual Output)	minutes/unit	9.8	19.3	20.55
5	Actual Output	portions	20	20	20
6	Effective Capacity	portions	35	35	35
7	Design Capacity	portions	50	50	50
8	Input	hours	3.27	6.43	6.85
9	Time Activated	minutes	196	386	411
10	Time Available	minutes	420	420	420

From *Table 3*, pre-order system does have the setup time and the run time. In this case, the setup time is started from order activity, until communicate the order with the outsourced cooker activity which took about 20 minutes until 235 minutes (each event has different total time).

- **Flow time** specified in *Table 3* occur from the average time that it takes a unit to move through an entire production process (176 minutes / 20 units = 8.8 minutes/unit).
- **The cycle time** is 9.8 minutes/unit when the raw materials and packaging are still available (196 minutes processing the order/20 portions = 9.8 minutes/portion).
- The average **actual output** is about 20 portions, for all events, due to the market demand and the outcome of the workers capability.
- The **effective capacity** which DeliBowl Company have set is about 35 portions. Which DeliBowl Company decided to set about 70% from the design capacity
- The **design capacity** are 50 portions due to the capability of the workers, the market conditions, when the **input** is taken from time factor which took about 3.27 hours until 6.85 hours.
- The **time activated** through this process took about 196 minutes until 411 minutes, and the **time available** is 420 minutes (assumption).
-

Table 4 Pre-Order System Process Performance Metrics Measurements

No.	Metrics	Units	RM (+)	RM (-), ST (+)	RM (-), ST (-)
1	Operation Time (Setup Time + Run Time)	Minutes	196	366	411
2	Flow Time (Total Run Time/Actual Output)	minutes/unit	8.8	8.8	8.8
3	Cycle Time (Total Time Activated/Actual Output)	minutes	9.8	18.3	20.55
4	Throughput Rate (1/Cycle Time)	unit/minute	0.10	0.05	0.04
5	Efficiency (Actual Output/Effective Capacity)	%	57.14	57.14	57.14
6	Productivity (Effective Capacity/Input)	unit/hour	10.70	5.44	5.109
7	Utilization (Actual Output/Design Capacity)	%	40	40	40

This table above represents the results of the pre-order process performance metrics measurements, occur when the *operational time = setup time + run time*, the *velocity* (*value added time/flow time*) is 0 because there is no added useful work is actually being done on the unit in whether in DeliBowl pre-order system and later in direct-selling system. We can see those the *efficiency* (*actual output/effective capacity*) are still low, and getting lower if the raw materials, packaging, and also stickers are out of stock.

Table 5 Direct-Selling System Process Performance Metrics

Direct-Selling System						
No.	Metrics	Units	RM (+), P (+)	RM (-), P (+)	RM (-), P (), ST (+)	RM (-), P(-), ST (-)
1	Setup Time	minutes	125	125	125	125
2	Run Time	minutes	420	420	420	420
3	Flow Time (Total Run Time/Actual Output)	minutes/unit	21	21	21	21
4	Cycle Time (Total Time Activated/Actual Output)	minutes/unit	31.6	37.6	39.85	41.85
5	Actual Output	portions	20	20	20	20
6	Effective Capacity	portions	35	35	35	35
7	Design Capacity	portions	50	50	50	50
8	Input	hours	10.53	12.53	13.28	13.95
9	Time Activated	minutes	632	752	797	837
10	Time Available	minutes	900	900	900	900

In direct-selling system, there are also different results each events. Before the researcher show the result of this process performance metrics measurements, we can see that the run time seems take much time to be done. **Flow time** specified in *Table 5.9* occur from the average time that it takes a unit to move through an entire process (for example, event (RM (+), P (+)) 420 minutes / 20 units = 21 minutes/unit).
The **cycle time** occur when the total of whole process time is divided by units. About 31 until 41 minutes/unit.

Table 6 Direct-Selling System Process Performance Metrics Measurements

No.	Metrics	Units	RM (+), P (+)	RM (-), P (+)	RM (-), P (-), ST (+)	RM (-), P(-), ST (-)
1	Operation Time (Setup Time + Run Time)	Minutes	545	545	545	545
2	Flow Time (Total Run Time/Actual Output)	minutes/unit	21	21	21	21
3	Cycle Time (Total Time Activated/Actual Output)	minutes	31.6	37.6	39.85	41.85
4	Throughput Rate (1/Cycle Time)	unit/minute	0.03	0.02	0.02	0.02
5	Efficiency (Actual Output/Effective Capacity)	%	57.14	57.14	57.14	57.14
6	Productivity (Effective Capacity/Input)	unit/hour	3.32	2.79	2.63	2.50
7	Utilization (Actual Output/Design Capacity)	%	40	40	40	40

Table 6 represents the different results from pre-order system, which has lower *utilization* and *productivity*.

Benchmark through Yagami Ramen House

Yagami Ramen House Company is a bowl-based restaurant provides ramen, rice bowls, and desserts, which has 4 outlets and have 11 hours of open time (11.00 – 22.00) or 660 minutes. Each outlet has 8-12 workers in kitchen, which 2 of them are focused on the production process, and the rest are in charge of preparation, order input. So that there are about 8 workers for 4 outlets and have 5 working hour. The process will be divided into 3 main processes: preparation; production; finishing, whereas the delivery process to customers happen.

Figure 1 Benchmark results: Flow Time

We can see the different between DeliBowl and Yagami Ramen House. Yagami Ramen House do have the smallest minutes needed to produce one unit in flow time. The total flow time needed in Yagami Ramen House process is about 0.44 minutes to finish one unit. Unlike DeliBowl pre-order system and direct-selling system, which has more time needed to finish a product (8.8 minutes/unit & 21 minutes/unit).

Throughput Rate

Figure 2 Benchmark results: Throughput Rate

In this comparison, the result shows that Yagami Ramen House can produce the product more efficiently than DeliBowl, about 2 units per minute. The difference between Yagami Ramen House and DeliBowl throughput rate is very high, which more than about 90%.

Cycle Time

a) Efficiency

Figure 4 Benchmark results: Efficiency

The comparison between DeliBowl Company between DeliBowl direct-selling system and Yagami Ramen House is about 41 minutes or above 90%.

This key performance indicator tells about how much time needed to complete the unit due to the whole process. Yagami Ramen House still be the benchmark of DeliBowl Company to the better process improvement. The ratio between DeliBowl and Yagami Ramen House is also high. If we see the figure above, the ratio and Yagami Ramen House in efficiency, Yagami Ramen House still in the best position than others. Because, from the observation, Yagami Ramen House set the capacity which is compatible to the capability of the workers, market condition, and outlets. And the reality that Yagami Ramen House could process the units which almost the number of the effective capacity.

Measurements of DeliBowl Company business process include the *productivity*, *efficiency*, *cycle time*, *throughput rate*, and flow time have bad result in preorder and direct-selling system compared to Yagami Ramen House. (See section 5.3)

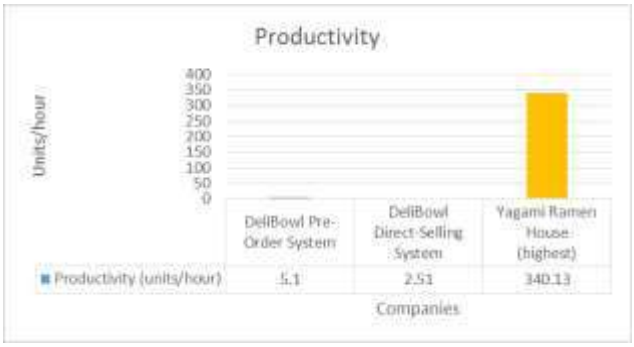

Figure 5.5 Benchmark results: Productivity outsourced cooker become the problem itself.

b) Productivity

- The **environment** mentioned in *Figure 5.18* is the fact that the market is too far away from DeliBowl workspace, which requires DeliBowl to mobilize and spend money to reach the market to buy raw materials.
- DeliBowl still do not have supplier in raw materials and packaging
- DeliBowl **pre-order system** still causes high production cost especially for the outsourced cooker.
- Manpower in this case includes outsourced cooker and the fixed employee. The outsourced cooker is required because to ease the pre-order process.

From the figure above, Yagami Ramen House could produce 340 units within an hour, which is about 300 units more productive than DeliBowl. It is also because the effective capacity which is set by Yagami Ramen House are much higher than DeliBowl. Yagami Ramen House have more capable human resources, outlets, and other capital.

After the causes of the problem are determined, the researcher establish process improvement main steps to get the best outcome of improvement as the milestone, which can get more efficient process, reduce costs. The researcher expect that the steps will be discussed can overcome the problems. The main steps which will be discussed as follows:

- Eliminate Pre-Order System. Although pre-order system have better result in some key performance indicators, the pre-order system should be eliminated because of some reasons which will be discussed in the next section.
- Revise Direct-Selling System Process such as deleting some time-consuming activity, adding a useful activity which can support the productivity and the efficiency.
- Comparison of Process Performance Measurement, to know the process performance metrics measurement after the current process performance metrics

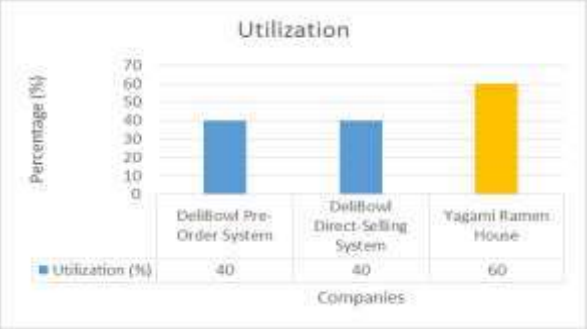

Figure 6 Benchmark results: Utilization

From the data those have been presented before in, we can see that DeliBowl business operation whether using pre-order system and direct-selling system, still causes the main problem in which the production costs are still high.

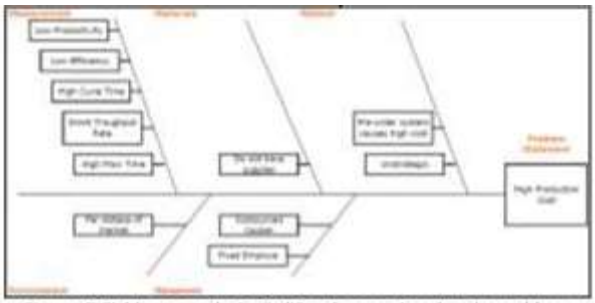

Figure 7 Fishbone analysis: DeliBowl operational main problem

Figure 7 represents the problems are summarized to be the causes of the main problem.

Let's step back from DeliBowl pre-order system process. Pre-order system seems have better result in some key performance indicators such as:

- Flow time, which is lower than the direct-selling system (Pre-Order = 8.8 minutes/unit, Direct-Selling = 21 minutes/unit).
- Throughput rate, which is also lower than the directselling system (Pre-Order = 0.048 units/minute, DirectSelling = 0.023 units/minute
- Cycle time is lower than the direct-selling system (PreOrder = 20.55 minutes/unit, Direct-Selling = 41.85 minutes/unit).
- Productivity is higher than direct-selling system (PreOrder = 5.1 units/hour, Direct-Selling = 2.51 units/hour).
- As we can see, it requires high cost for pre-order system, which DeliBowl Company would have profit margin below 0 rupiah, or in other words, loss. If this is continued, the company would go bankrupt sooner or later.

However, although pre-order system have better result in some key performance indicators, pre-order system should be eliminated because of the big problem in the cost section. If we look at Table 7, if the number of order is increased, it can also increase the outsourced cooker fee too. So that if the order is increased, the probability of danger (high loss) will be increased too.

Table 7 Pre-Order System Process Cost

Activity	Cost/Revenue
Order	Rp0
Check the availability of raw materials & packaging	Rp0
Give the money to the outsourced cooker for buying raw materials	Rp244,120
Go to Pasar Ciroyom	Rp0
Go to Jl. Cibadak (need money for fuel)	Rp10,000
Buy Raw Materials	Rp0
Buy Packaging (cost per packaging = Rp 1.200, times 20)	Rp28,000
Go to Jl. Diputikur (for parking fee)	Rp2,000
Print Sticker (A4 sticker)	Rp5,000
Go to Storage (parking fee)	Rp2,000
Keep the packaging and put the sticker	Rp0
Give the packaging to outsourced cooker	Rp0
Communicate the order with the outsourced cooker	Rp0
Process the order	Rp0
Take the products	Rp0
Deliver to resellers	Rp0
Pay the outsourced cooker	Rp60,000
Go Home	Rp0
Book Keeping	Rp0
TOTAL OPERATIONAL COST	Rp351,120

SALES	Rp300,000	MARGIN
IF RAW MATERIALS & PACKAGING ARE AVAILABLE (RM (+))	Rp60,000	Rp240,000
IF RAW MATERIALS & PACKAGING ARE OUT OF STOCK, BUT STICKERS ARE AVAILABLE (RM (-), ST (+))	Rp306,120	-Rp6,120
IF RAW MATERIALS & PACKAGING, AND STICKERS ARE OUT OF STOCK (RM (-), ST (-))	Rp351,120	-Rp51,120

RM (+), P (+)	**20**	20
RM (-), P (-), ST (+)	**100**	185
RM (-), P (-), ST (-)	**155**	225

Revise Direct Selling System

Reflecting Yagami Ramen House business process in preparation, which there is required, they make a deal with the supplier every 2 weeks, so that if the raw materials are still available during 2 weeks, it is not necessary to contact the supplier. This can be added to the presentation process of DeliBowl. Which can be described as in Figure 9 in colored activity shapes.

Figure 9. Preparation Process Improvement

As we can see from the figure above, we can eliminate the previous activities which took longer time by adding 2 more activities: those are **contact the supplier**, only takes 5 minutes; and **Supplier deliver raw materials and packaging** which only takes 45 minutes. We can determine the whole preparation process which can be divided into 3 events:

1. It takes 20 minutes to finish the process if the raw materials and packaging, including the stickers are already available.
2. It takes 100 minutes (1 hours 40 minutes) to finish the process if the raw materials and packaging are out of stock, but the stickers are available.
3. It takes 155 minutes (2 hours 35 minutes) to finish the process if the raw materials, packaging, and also the stickers are out of stock.

This is the form of the summary of time shown in *Table 8* to know the detail of time used such in the preparation process.

Table 8 Preparation Process Time Summary

Activity	Improvement Time Result (Minutes)	
Go to DeliBowl	10	
Check the availability of raw materials	10	
List the raw materials needed	20	
Contact the supplier	5	
Supplier deliver raw material and packaging	45	
Go to Jl. Dipatiukur	15	
Print Sticker	10	
Go back to DeliBowl	30	
Sticker Assembling	30	Current Time Result (Minutes)
Keep them in storage	10	
TOTAL TIME (MINUTES)	185	260

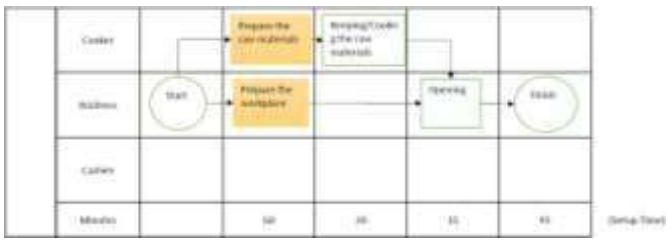

Figure 10 Production Process Improvement: Setup

The improvement in setup production process can be applied by parallel. We can see in Figure 10, 2 activities (prepare the raw materials, prepare the workplace) can be done in only one time by grouping the tasks for each different staff. This can reduce the process time. In running process, when the outlet is open, we can reduce the flow time by adding the capacity by the fact that there is no pre-order system anymore, so that the researcher recommend DeliBowl to

cooperate with Go-Food. Go-Food by Go-Jek is a mobile app which can find the restaurant and deliver the food to the direction, on the other words, Go-Food is a food-delivery app. Let us set the effective capacity while running time using Go-Food is 35 units, and add the current effective capacity which is 35 units (Effective capacity = 35 + 35 units = 70 units). If the total running time is 420 minutes, and w•e estimate that the probability of actual output from Go-Food is 20 units, and then the flow time will be decreased, which is 10.5 minutes/unit (420 minutes ÷ 40 units = 10.5 minutes/unit)

Table 9 Production Process Time Summary

Activity	Improved Time Result (Minutes)		Current Time Result (Minutes)	
Prepare the workplace	60	(85 minutes)	30	(125 minutes)
Prepare the raw materials			60	
Keeping/cooling the raw materials	20		20	
Opening	15		15	
Waiting for Customer	4	(10.5 minutes)	8	(21 minutes)
Order	1		2	
Cooking Process	4		8	
Platting/Packaging	0.5		1	
Serving	0.5		1	
Payment	0.5		1	
Run Time (Flow Time x 40 unit)	**420**		**420**	
TOTAL TIME	**505**		**545**	

Table 10 DeliBowl Process Improvement Process Performance Metrics

Improved DeliBowl Process				
Metrics	Units	RM (+), P (+)	RM (-), P (), ST (+)	RM (-), P (-), ST (-)
Setup Time	minutes	85	85	85
Run Time	minutes	420	420	420
Flow Time (Total Run Time/Actual Output)	minutes/unit	10.5	10.5	10.5
Cycle Time (Total Time Activated/Actual Output)	minutes/unit	14.8	16.8	18.175
Actual Output	portions	40	40	40
Effective Capacity	portions	60	60	60
Design Capacity	portions	70	70	70
Input	hours	9.86	11.2	12.11
Time Activated	minutes	592	672	727
Time Available	minutes	900	900	900

Flow time specified in Table 10 occur from the average time that it takes a unit to move through an entire production process (176 minutes (see Figure 5.36) / 40 units = 10.5 minutes/unit). (See Chapter 3)
Value added time is 50 because there an added useful work is actually being done on the unit in this improved process such as contact the raw material and packaging supplier. The cycle time is 14.8 until 18.175 minutes/unit (total time activated in minutes processing the order/40 portions).
The average actual output is about 40 portions, for all events, due to the market demand and the outcome of the workers capability.
The effective capacity after this improvement is 60 portions, about 85% of design capacity.
The design capacity are 70 portions assumed that the capability of workers after the improved process, they will more be free to produce, the size of market, have more extra time about 1 hour (See Table 5.4 and Table 5.16), when the input took about 9.86 hours until 12.11 hours.
The time activated through this process took about 592 minutes until 727 minutes, and the time available is 900 minutes (assumption).

Table 11 DeliBowl Process Improvement Process Performance Metrics Measurement

Metrics	Units	RM (+), P (+)	RM (-), P (-), ST (+)	RM (-), P (-), ST (-)
Operation Time (Setup Time + Run Time)	Minutes	505	505	505
Flow Time (Total Run Time/Actual Output)	minutes/unit	10.5	10.5	10.5
Cycle Time (Total Time Activated/Actual Output)	minutes	14.8	16.8	18.175
Throughput Rate (1/Cycle Time)	unit/minute	0.06	0.05	0.05
Efficiency (Actual Output/Effective Capacity)	%	66.66	66.66	66.66
Productivity (Effective Capacity/Input)	unit/hour	6.08	5.35	4.95
Utilization (Actual Output/Design Capacity)	%	57.14	57.14	57.14

After measuring through its process performance after improvement, the data above show changes due to the current process. The actual output may higher sometimes depend on the market changes. To *compare* the result between the current process and the improved process can be shown as in *Figure 11* until *Figure 16.*

Current vs Improved: Flow Time

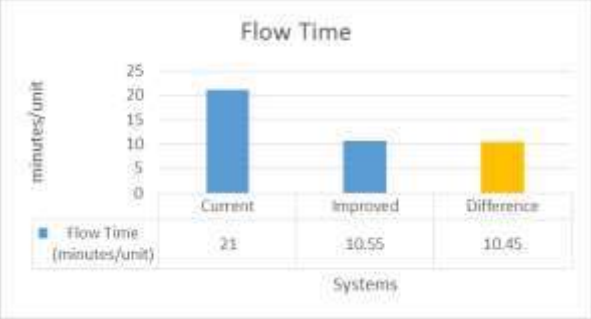

Figure 11 Process Improvement Comparison: Flow Time

From the figure shown, after the process improvement such as revise the process, cooperate with Go-Jek and increase capacity, the researcher could assume that DeliBowl would need less time

to complete a unit in the production process than the previous DeliBowl operating system. The improved process can save time about 10 minutes to finish one product.

Current vs Improved: Throughput Rate

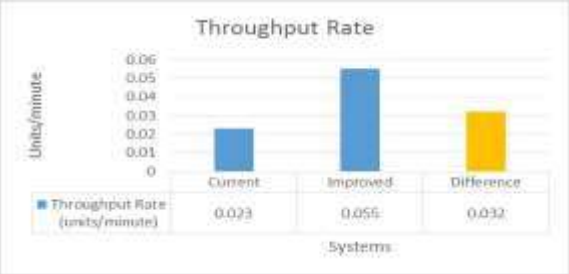

Figure 12 Process Improvement Comparison: Throughput Rate

In this comparison, the result shows that the improved process can produce the product more efficiently than the current process of DeliBowl, about 0.055 units per minute. The difference between the improved and current process of DeliBowl throughput rate is high, which more than about 90%.

Current vs Improved: Cycle Time

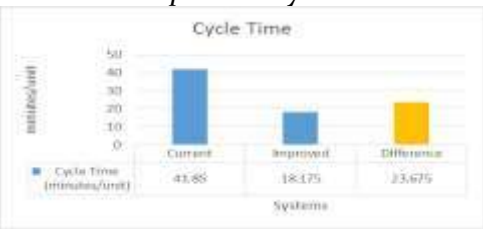

Figure 13 Process Improvement Comparison: Cycle Time

This key performance indicator tells about how much time needed to complete the unit due to the whole process. The result shows that the ratio between the improved process and the current process of DeliBowl is also high. The improved process could save about 50% time than the current process. *Current vs Improved: Efficiency*

Figure 14 Process Improvement Comparison: Efficiency

The improved process and the current process has the same efficiency. It is because in this case, the **efficiency** occurs when the actual output is divided by the effective capacity. The actual output is still the assumption, so it can be higher depends on the market capability.

Current vs Improved: Productivity

Figure 15 Process Improvement Comparison: Productivity

From the figure above, the improved process could produce 5.77 units within an hour, which is about twice more productive than the current process of DeliBowl. *Current vs Improved: Utilization*

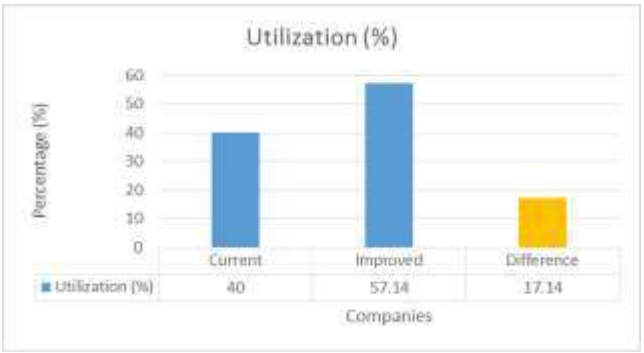

Figure 16. Process Improvement Comparison: Utilization

After increase the capacity, and remake the process, then it gives the impact to the utilization which is increased. The improved process is expected to operate the business facility, human resources, raw materials and times better than the current process of DeliBowl.

Cost Elimination through Process Improvement

The process improvement of DeliBowl require the phases those give impact to the cost reduction such as preorder system elimination, process revise, increase capacity, and make a deal with supplier. This is the breakdown of the cost structure after the process has been improved.

Table 12 DeliBowl Process Improvement Cost

Activity	**Per one-time Re Stock for 2 weeks supply**	**Per Month (2 times re stock)**
Go to DeliBowl	Rp0	Rp0
Check the availability of raw materials & packaging	Rp0	Rp0
List the raw materials needed	Rp0	Rp0
Contact the supplier and make order	Rp0	Rp0
Supplier deliver raw material and packaging	Rp1,904,753	Rp3,809,506
Go to Jl. Dipatiukur (parking fee)	Rp2,000	Rp4,000
Print Sticker for 12 day supply	Rp60,000	Rp120,000
Go back to DeliBowl	Rp0	Rp0
Sticker Assembling	Rp0	Rp0

TOTAL OPERATIONAL COST	**Rp1,966,753**	**Rp3,933,506**
TOTAL SALES	**Rp3,960,000**	**Rp7,920,000**
PROFIT MARGIN	**Rp1,993,247**	**Rp3,986,494**

In this case, the need of contacting supplier, moving to Jl. Dipatiukur, only occur for 2 times a month. Let us assume that after make a deal with the supplier of raw materials and packaging, then we can also get lower price because we have order in big amount of supplies, it is possible to ask for the discount.

Figure 17 DeliBowl Process Improvement Cost Comparison

Figure 17 represents the comparison of cost needed to run the system. DeliBowl current process seems had lower cost and lower key performance indicators than in pre-order system. But, after pre-order system has been eliminated, and the direct-selling system process has also been revised, then it can reduce the cost. If DeliBowl use the main steps of the process improvement, they may save the money about more than 1 *million rupiah per month.Forecast The Independent Demand*

Conclusion

Based on the data analysis, it can be seen that before we determine the time needed to finish the process, we have to build the flowchart to know exactly the activities in detail. From the existing sales data in Chapter 1, it can be seen that DeliBowl still have low profit margin. From the problems are stated, the most significant issue is the inefficient of the production processes and the cost which causes the low of the profit margin. We need process performance metrics measurement to know if there are problems in the process or not. After that, we put the time inside the flowchart and group the activities to each job description. We found that before we set the strategies of process improvement, the key performance indicators result such as the flow time (21 minutes/unit), cycle time (41.85 minutes/unit), throughput rate (0.023 units/minute), efficiency (57%), productivity (2.51 units/hour), and utilization (40%) are still in bad condition. After the researcher analyze, there are big problems caused the main problem discussed in this topic. The researcher has decided that pre-order system has been eliminated, and the directselling system process has also been revised, then it can reduce the cost, in which give the better result such as the the key performance indicators are already in better condition, the flow time (10.55 minutes/unit), cycle time (18.175 minutes/unit), throughput rate (0.055 units/minute), efficiency (66.66%), productivity (4.95 units/hour), and utilization (57.14%). If DeliBowl use the main steps of the process improvement, they may save the money about more than 1 million rupiah per month.

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